IN THE SECIFICATION:

Please replace the paragraphs of the specification as follows:

[00007] Future airborne radar systems may operate in a difficult environment where the detection of small and maneuverable targets may occur against a strong clutter background and jamming operations. Directed beams of energy from transmitters may be susceptible to jamming countermeasures and detection. Power aperture increases may not be effective to overcome these limitations and countermeasures against radar detection. Thus, future systems may desire increased sensitivity without increasing power requirements. This condition may be applicable especially to radar systems where the transmitter power is not controlled by the receiving party.

[00008] Mobile radar systems often operate in the presence of jamming interference and monostatic clutter that are produced naturally by ground reflections. Difficulties may arise if both the transmitter and receiver are in motion, such as an airborne radar system. When both the transmitter and receiver of a radar system are in motion, the rank of the clutter covariance may be increased. An increased number of degrees of freedom in the receiver system may be needed to achieve a specified level of clutter suppression. Thus, a transmitter or receiver in motion may increase the clutter interference with a signal, or increase the complexity within the receiver in accounting for the increased degrees of freedom.

[00012] According to another disclosed embodiment, a method for generating a sensor signal for a received signal within an adaptive broadcast radar system is disclosed. The method includes defining a clutter component for the received signal at a receiver. The clutter component comprises a direct path signal and a scattered signal. The method also includes defining a channel transfer function. The method also includes generating a sampled version of

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the received signal according to the channel transfer function at a sample time. The method also includes determining a batch of data from the sampled version for a sub-aperture of the receiver at the sample time. The method also includes indexing the batch of data into the sensor signal model.

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[00016] Additional features and advantages of the invention will be set forth in the description which follows, and in part will be apparent from the description, or may be learned by practice of the invention. The objectives and other advantages of the invention will be realized and attained by the structure particularly pointed out in the written description and claims hereof as well as the appended drawings.

[00017] The accompanying drawings, which are included to provide further understanding of the invention and are incorporated in and constitutes a part of this specification, illustrate embodiments of the present invention and together with the description serves to explain the principles of the invention. In the drawings:

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[00028] Receiving system 100 represents a family of multi-static wide area target surveillance sensors. Receiving system 100 exploits continuous wave ("CW") electromagnetic energy. Preferably, receiving system 100 may receive transmissions from a plurality of transmitters 110, 112, and 114. Preferred embodiments of the transmitters for use in an adaptive broadcast radar system are disclosed below in greater detail. Transmitters 110, 112, and 114, however, may include any device, system or means to transmit uncontrolled signals.

[00029] Transmitters 110, 112, and 114 may transmit wideband electromagnetic energy transmissions in all directions. Some of these transmissions are reflected by one or more targets

of interest 150 and received by receiving system 100. For example, reflected transmission 130 may be reflected by target 150 and received by receiving system 100. Further, with regard to transmitter 114, reference transmission 140 may be received directly by receiving system 100. Receiving system 100 may compare reference transmission 140 and reflected transmission 130 to determine positional information about one or more targets of interest 150. Reference transmission 140 also may be known as a direct path signal. Reflected transmission 130 also may be known as a target path signal. Positional information may include any information relating to a position of target 150, including location, velocity, and acceleration from determining a time difference of arrival ("TDOA"), a frequency difference of arrival ("FDOA") and an angle of arrival ("AOA").

[00030] Receiving system 100 may comprise different components, including receiver 102 and processing unit 104. According to the disclosed embodiments, transmitter 110 may be a transmitter array, while receiver 102 may be a receiver array. Transmitter 110 may include a plurality of elements such that each element transmits an independent signal. The signals may comprise orthogonal or pseudo-orthogonal signals. Each of the plurality of elements for the transmitter and the receiver may comprise a dipole with a back-plane. Transmitter 110 may be in motion, and not at a fixed position.

[00031] Receiver 102 may be a moving receiver array that includes a plurality of elements such that each element is configured to receive a scattered signal. Further, receiver 102 is configured to receive a set of information relating to the independent signals of each of the first plurality of elements. The radar functions of the disclosed embodiments may be performed using information received by any receiver with suitable receiving equipment and knowledge of the transmitter waveform codes. Receiver 102 may be in motion, and not at a fixed position. Further, there may be a plurality of receivers, with all the receivers in motion. The receivers may not be coupled together, or in communication, so as to act independently of each other. For example, each receiver may be on moving vehicles within a certain area of emphasis. The receivers within the area may receive the transmitted signals continuously from the transmitters, such as transmitter 110.

[00033] Processing unit 104 may reformulate each of the independent signals provided by receiver 102. Accordingly, each processing unit 104 may form independently all potential beams generated by transmitter 110, or any subset of beams generated by transmitter 110. Because processing unit 104 does not control transmitter 110, a single transmitter may be utilized by multiple receiver/ processing unit combinations. Thus, signals from a single transmitter may be recreated at each receiver, independently of the transmitter and the other receivers.

[00035] According to the disclosed embodiments, radar detection system 10 may provide the mechanism to obtain radar parameters, such as ground moving target indication ("GMTI"), air moving target indication ("AMTI"), and synthetic aperture radar ("SAR") imaging by forming simultaneous transmitter and receiver beams. The gain and directivity of each of the simultaneous transmitter and receiver beams may be comparable to known systems, such as phased array radar and bistatic radar technology. Using radar detection system 10, the transmitter and receiver beamforming may be controlled by a user within the field of view of the transmitter, provided the user has knowledge of the radar waveform codes. Thus, radar functions may be provided on-demand over wide geographical areas. The radar transmitter may be shared

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by multiple users over a wide geographical area without the need for specific requirements to task the source of illumination. For example, referring to Fig. 1, transmitter 110 and receiver 102 are not coupled to each so as to exchange data.

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[00041] Radar system 10 may share transmitter resources among a wide variety of users such that a prior tasking or the control of transmitter resources is not critical. Additional processing, intelligence, or tasking is avoided at the transmitter, other than operations to code independent waveforms. Radar functions may be performed against objects, or targets, anywhere within the field-of-view of the independently coded sub-arrays within the transmitter. Where coding occurs at the element level, the radar functions may be performed against objects anywhere in the forward hemisphere of the transmitter array by any user with suitable receiving equipment and knowledge of the transmitter waveform codes. The transmitted signal waveforms may be reconstructed at the receiver, thus, possibly eliminating the need for a directed transmitted beam.

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[00050] Sub-apertures 310, 320, and 330 also include receivers 316, 326, and 336, respectively. Receivers 316, 326, and 336 may be low-noise, high dynamic range receivers. In receivers 316, 326 and 336, sub-aperture formation may be used to reduce cost and complexity of the radar system if the adaptive broadcast radar transmitter, such as transmitter 200, is utilized for surveillance or reconnaissance in a restricted area. To support operations that desire wide area coverage, the radar system may operate at a lower frequency to reduce system complexity without a corresponding reduction in coverage. Receivers 316, 326, and 336 are coupled to adaptive broadcast radar transmitter channel demultiplexers 350, 360, and 370, respectively. Preferably, each demultiplexer is dedicated to each respective sub-aperture.

[00066] The STAP covariance may be modeled as a diagonal matrix, independently of delay and time to provide simultaneous fixed transmitter and receiver beamforming. Weight vectors are proportional to the steering vector and provide the amplitude and phase adjustments desired to steer the transmitter and receiver beams in a particular direction. Diverse types of fully adaptive and partially adaptive STAP algorithms designed to adapt both transmitter and receiver antenna patterns may be specified in terms of the weight vectors. For example, bistatic DPCA may be implemented using steering vector components [may be] defined by:

$$G = \begin{Bmatrix} g_j \otimes g_k \\ -2g_j \otimes g_k \\ g_j \otimes g_k \end{Bmatrix}$$

[00074] Step 616 executes by generating the data quads according the indices. The indices, (j, k, m, n) may define points in the four-dimensional data quads. Standard index mapping may be used to transform the dimensional data vector into a one-dimensional vector, χ_μ. Step 618 executes by estimating the measurement covariance, R, for the vector disclosed above. Standard STAP techniques may be applied to estimate the measurement covariance, or $R_{\mu\mu'} = \langle \chi_\mu * \chi_{\mu'} \rangle$. Step 620 executes by computing the STAP weight vectors. The STAP weight vectors, W, may be computed in terms of the covariance and the steering vector, G, or $W = R^{-1}G$. As disclosed with reference to Fig. 5, the weight vectors provide the amplitude and phase adjustments desired to steer beams in a particular direction.

[00075] [deleted]

[00080] Step 704 executes by generating an integral of the received signal. The received signal may be re-expressed in terms of a continuous integral over the delay measurement, τ, or

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$$X_p(k,t) = \sum_{j=0}^{J-1}\left\{H_{0:j,k}(t)V_{jk}(t) + \int_{\Delta\tau} H_{c:j,k}(\tau',t)V_{jk}(t-\tau')d\tau'\right\} + \nu(t)$$

where $V_{jk}(t) \equiv e^{i\psi^{j}{}_{k}(t)}$.

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[00093] Step 812 executes by performing motion compensation to remove time dependent phase delays between transmitter 200 and receiver 300. Motion compensation may be performed independently for each sub-aperture of receiver 300. Step 814 executes by determining the delay and doppler, if applicable, for the received signal. This information may be placed into a channel transfer function. Once the motion compensation and delay/doppler steps are complete, Step 816 executes by determining the remaining characteristics of the transmit signal.